C L A I M S

[1] A thermoplastic resin sheet having a laminated structure including a first polyvinyl acetal resin layer (A) and a second polyvinyl acetal resin layer (B), characterized in that:

said first polyvinyl acetal resin layer (A) contains a plasticizer and a first polyvinyl acetal resin obtained via acetalization of polyvinyl alcohol with at least one aldehyde (a) selected from the group consisting of aldehydes having 4 - 6 carbon atoms;

said second polyvinyl acetal resin layer (B) contains a plasticizer and a second polyvinyl acetal resin in the form of a coacetalized product obtained via coacetalization of polyvinyl alcohol with at least one aldehyde (a) selected from the group consisting of aldehydes having 4 - 6 carbon atoms and with at least one aldehyde (b) selected from the group consisting of aldehydes having 1 - 3 carbon atoms; and

a polymer unit (X) and a polymer unit (Y), in total, account for at least 55 % by mole while the first polymer unit (X) alone accounts for 0.5 - 80 % by mole of the total of said coacetalized product, wherein the polymer unit (X) is an acetalized unit derived from the first aldehyde (a) and the polymer unit (Y) is an acetalized unit derived from the second aldehyde (b).

[2] A thermoplastic resin sheet having a laminated structure including a first polyvinyl acetal resin layer (A) and a second

polyvinyl acetal resin layer (B), characterized in that:

said first polyvinyl acetal resin layer(A) contains a plasticizer and a first polyvinyl acetal resin obtained via acetalization of polyvinyl alcohol with at least one aldehyde (a) selected from the group consisting of aldehydes having 4 - 6 carbon atoms;

said second polyvinyl acetal resin layer (B) contains a plasticizer and a second polyvinyl acetal resin in the form of a coacetalized product obtained via coacetalization of polyvinyl alcohol with at least one aldehyde (a) selected from the group consisting of aldehydes having 4 - 6 carbon atoms and at least one aldehyde (b) selected from the group consisting of aldehydes having 1 - 3 carbon atoms;

said thermoplastic resin sheet has such a structure that the first polyvinyl acetal resin layer (A) is provided on each side of at least one second polyvinyl acetal resin layer (B); and,

in the second polyvinyl acetal resin layer (B), a polymer unit (X) and a polymer unit (Y), in total, account for at least 55 % by mole while the first polymer unit (X) alone accounts for 20 - 80 % by mole of the total of the coacetalized product, wherein the polymer unit (X) is an acetalized unit derived from the first aldehyde (a) and the polymer unit (Y) is an acetalized unit derived from the second aldehyde (b).

[3] A thermoplastic resin sheet having a laminated structure

including a first polyvinyl acetal resin layer (A) and a second polyvinyl acetal resin layer (B), characterized in that:

said first polyvinyl acetal resin layer(A) contains a plasticizer and a first polyvinyl acetal resin obtained via acetalization of polyvinyl alcohol with at least one aldehyde (a) selected from the group consisting of aldehydes having 4 - 6 carbon atoms;

said second polyvinyl acetal resin layer (B) contains a plasticizer and a second polyvinyl acetal resin in the form of a coacetalized product obtained via coacetalization of polyvinyl alcohol with at least one aldehyde (a) selected from the group consisting of aldehydes having 4 - 6 carbon atoms and at least one aldehyde (b) selected from the group consisting of aldehydes having 1 - 3 carbon atoms;

said thermoplastic resin sheet has such a structure that the first polyvinyl acetal resin layer (A) is provided on each side of at least one second polyvinyl acetal resin layer (B); and,

in the second polyvinyl acetal resin layer (B), a polymer unit (X) and a polymer unit (Y), in total, account for at least 55 % by mole while the first polymer unit (X) alone accounts for 0.5 - 20 % by mole of the total of the coacetalized product, wherein the polymer unit (X) is an acetalized unit derived from the first aldehyde (a) and the polymer unit (Y) is an acetalized unit derived from the second aldehyde (b).

[4] A thermoplastic resin sheet having a laminated structure including a first polyvinyl acetal resin layer (A) and a second polyvinyl acetal resin layer (B), characterized in that:

said first polyvinyl acetal resin layer(A) contains a plasticizer and a first polyvinyl acetal resin obtained via acetalization of polyvinyl alcohol with at least one aldehyde (a) selected from the group consisting of aldehydes having 4 - 6 carbon atoms;

said second polyvinyl acetal resin layer (B) contains a plasticizer and a second polyvinyl acetal resin obtained via acetalization of polyvinyl alcohol with at least one aldehyde (b) selected from the group consisting of aldehydes having 1 - 3 carbon atoms;

said thermoplastic resin sheet has such a structure that the first polyvinyl acetal resin layer (A) is provided on each side of at least one second polyvinyl acetal resin layer (B); and

said second polyvinyl acetal resin layer (B) has a degree of acetalization of at least 55 mole %.

[5] The thermoplastic resin sheet as recited in claim 1 or 2, characterized in that a molar ratio of the polymer unit (Y) to the polymer unit (X) in the coacetalized product constituting the second polyvinyl acetal resin layer (B), polymer unit (Y)/polymer unit (X), does not exceed 3.5.

[6] The thermoplastic resin sheet as recited in claim 1 or

3, characterized in that a molar ratio of the polymer unit (Y) to the polymer unit (X) in the coacetalized product constituting the second polyvinyl acetal resin layer (B), polymer unit (Y)/polymer unit (X), does not exceed 200.

[7] The thermoplastic resin sheet as recited in any one of claims 1 - 6, characterized in that:

a temperature t(A) at which a loss tangent tan δ measured at a frequency of 10 Hz for a sheet comprised solely of the polyvinyl acetal resin layer (A) shows a maximum value is in the range of 20 - 50 ℃;

a temperature t(B) at which a loss tangent tan δ for a sheet comprised of the second polyvinyl acetal resin layer (B) shows a maximum value is in the range of 35 - 70 ℃; and

t(B) - t(A) is in the range between 5 ℃ and 40 ℃.

[8] The thermoplastic resin sheet as recited in any one of claims 1, 2 and 5, characterized in that:

a temperature t(A) at which a loss tangent tan δ measured at a frequency of 10 Hz for a sheet comprised solely of the polyvinyl acetal resin layer (A) shows a maximum value is in the range of 20 - 50 ℃;

a temperature t(B) at which a loss tangent tan δ for a sheet comprised of the second polyvinyl acetal resin layer (B) shows a maximum value is in the range of 40 - 65 ℃; and

t(B) - t(A) is in the range between 5 ℃ and 25 ℃.

[9] The thermoplastic resin sheet as recited in any one of

claims 1 - 7, characterized in that an overlapping temperature region exists between a temperature range in which a loss tangent tan δ for a sheet comprised of the first polyvinyl acetal resin layer (A) is at least 0.3 and a temperature range in which a loss tangent tan δ for a sheet comprised of the second polyvinyl acetal resin layer (B) is at least 0.3.

[10] The thermoplastic resin sheet as recited in any one of claims 1, 2 and 5, characterized in that an overlapping temperature region exists between a temperature range in which a loss tangent tan δ for a sheet comprised of the first polyvinyl acetal resin layer (A) is at least 0.5 and a temperature range in which a loss tangent tan δ for a sheet comprised of the second polyvinyl acetal resin layer (B) is at least 0.5.

[11] The thermoplastic resin sheet as recited in any one of claims 1 - 10, characterized in that G' (B)/G' (A) is in the range of 1.0 - 10, wherein G' (A) is a shear storage modulus at 23 ℃ at 10 Hz of the first polyvinyl acetal resin layer (A) and G' (B) is a shear storage modulus at 23 ℃ at 10 Hz of the second polyvinyl acetal resin layer (B).

[12] The thermoplastic resin sheet as recited in any one of claims 1 - 11, characterized in that a ratio in tear strength of the second polyvinyl acetal resin layer (B) to the first polyvinyl acetal resin layer (A), tear strength (B)/tear strength (A), is at least 1.1 when measured according to JIS K 7128.

[13] The thermoplastic resin sheet as recited in any one of

claims 1 - 12, characterized in that tensile modulus (B)/tensile modulus (A) is at least 1.1, wherein the tensile modulus (B) is a tensile modulus of the second polyvinyl acetal resin layer (B) and the tensile modulus (A) is a tensile modulus of the first polyvinyl acetal resin layer (A) when both measured at 23 ℃ at a tensile strain rate of 1,250 %/min.

[14] The thermoplastic resin sheet as recited in any one of claims 1 - 13, characterized in that breaking energy (B)/breaking energy (A) is at least 1.1, wherein the breaking energy (B) is a breaking energy of the second polyvinyl acetal resin layer (B) and the breaking energy (A) is a breaking energy of the first polyvinyl acetal resin layer (A) when both measured at 23 ℃ at a tensile strain rate of 1,250 %/min.

[15] The thermoplastic resin sheet as recited in any one of claims 1 - 14, characterized in that maximum point stress (B)/maximum point stress (A) is at least 1.0, wherein the maximum point stress (B) is a maximum point stress of the second polyvinyl acetal resin layer (B) and the maximum point stress (A) is a maximum point stress of the first polyvinyl acetal resin layer (A) when both measured at 23 ℃ at a tensile strain rate of 1,250 %/min.

[16] The thermoplastic resin sheet as recited in any one of claims 1 - 15, characterized in that PVA polymerization degree (B)/PVA polymerization degree (A) is in the range of 0.5 - 3.0, wherein the PVA polymerization degree (B) is a degree of

polymerization of polyvinyl alcohol for constituting the second polyvinyl acetal resin layer (B) and the PVA polymerization degree (A) is a degree of polymerization of polyvinyl alcohol for constituting the first polyvinyl acetal resin layer (A).

[17] The thermoplastic resin sheet as recited in claim 16, characterized in that PVA polymerization degree (B)/PVA polymerization degree (A) is in the range of 1.0 - 3.0.

[18] The thermoplastic resin sheet as recited in any one of claims 1 - 17, characterized in that an ester group content of the second polyvinyl acetal resin layer (B) does not exceed 40 % by mole.

[19] The thermoplastic resin sheet as recited in any one of claims 1 - 18, characterized in that an ester group content of the second polyvinyl acetal resin layer (B) does not exceed 20 % by mole.

[20] The thermoplastic resin sheet as recited in any one of claims 1 - 19, characterized in that plasticizer content (A)/plasticizer content (B) is in the range of 1.0 - 3, wherein the plasticizer content (A) is a plasticizer content of the first polyvinyl acetal resin layer (A) and the plasticizer content (B) is a plasticizer content of the second polyvinyl acetal resin layer (B).

[21] The thermoplastic resin sheet as recited in any one of claims 1 - 20, characterized in that the first polyvinyl acetal resin layer (A) and/or the second polyvinyl acetal resin layer

(B) contains functional fine particles.

[22] The thermoplastic resin sheet as recited in any one of claims 1 - 21, characterized in that the first polyvinyl acetal resin layer (A) and/or the second polyvinyl acetal resin layer (B) contains a crosslinked polyvinyl acetal resin or comprises an intermolecularly crosslinked polyvinyl acetal resin.

[23] The thermoplastic resin sheet as recited in any one of claims 1 - 22, characterized in that thickness (B)/thickness (A) is in the range of 0.5 - 10, wherein the thickness (B) is a thickness of the second polyvinyl acetal resin layer (B) and the thickness (A) is a thickness of the first second polyvinyl acetal resin layer (A).

[24] The thermoplastic resin sheet as recited in any one of claims 1 - 23, characterized in that at least one polyvinyl acetal resin layer (B) is interposed between the polyvinyl acetal resin layers (A) having different thicknesses.

[25] A laminate including at least one layer of the thermoplastic resin sheet as recited in any one of claims 1 - 24.

[26] The laminate as recited in claim 25, characterized in that said thermoplastic resin sheet is securely interposed between a glass plate and a transparent resin plate.

[27] The laminate as recited in claim 26, characterized in that said transparent resin plate is composed of at least one selected from the group consisting of polycarbonates, acrylic resins,

acrylic copolymer resins and polyesters.

[28] The laminate as recited in claim 26, characterized in that said transparent resin plate is coated with a transparent elastomer.

[29] The laminate as recited in claim 25, characterized in that said thermoplastic resin sheet is securely interposed between a pair of glass plates.

[30] The laminate as recited in any one of claims 26 - 29, characterized in that at least one of said glass plates is a colored transparent glass plate.

[31] The laminate as recited in any one of claims 25 - 30, characterized as having a surface density of not higher than 12 kg/m^2.